

1. A communication system comprising:

a first interface system configured to receive a first Synchronous Optical Network (SONET) signal including first section overhead and first line overhead in a first transport overhead and including path overhead and user data in a first payload, and in response, to transfer the first section overhead, the first line overhead, the path overhead, and the user data; and

a second interface system configured to receive the first section overhead, the first line overhead, the path overhead, and the user data, and in response, to regenerate the first SONET signal including the first section overhead and the first line overhead in the first transport overhead and including the path overhead and the user data in the first payload, and to transfer the regenerated first SONET signal.

2. The communication system of claim 1 further comprising an optical network configured to receive the first section overhead, the first line overhead, the path overhead, and the user data from the first interface system and to transfer the first section overhead, the first line overhead, the path overhead, and the user data to the second interface system.

3. The communication system of claim 2 wherein a first communication service provider transfers the first SONET signal to the first interface system and receives the regenerated first SONET signal from the second interface system, and wherein the communication system is part of a second communication service provider.

4. The communication system of claim 3 wherein the communication system in the second communication service provider closes a SONET ring for the first communication service provider.
- 5 5. The communication system of claim 1 wherein the first interface system is configured to transfer the path overhead and the user data by transferring a second SONET signal including second section overhead and second line overhead in a second transport overhead and including the path overhead and the user data in a second payload.
- 10 6. The communication system of claim 1 wherein the first interface system is configured to transfer the first section overhead and the first line overhead by transferring a second SONET signal including the first section overhead and the first line overhead in a second payload.
- 15 7. The communication system of claim 1 wherein the first interface system is configured to receive the first SONET signal over a single optical wavelength and to transfer the first section overhead, the first line overhead, the path overhead, and the user data in parallel over multiple optical wavelengths.
- 20 8. The communication system of claim 7 wherein the second interface system is configured to receive the first section overhead, the first line overhead, the path overhead, and the user data in parallel over the multiple optical wavelengths and to transfer the regenerated first SONET signal over the single optical wavelength.

9. The communication system of claim 1 wherein the second interface system is configured to receive the path overhead and the user data by receiving a second SONET signal including second section overhead and second line overhead in a second transport overhead and including the path overhead and the user data in a second payload.

5

10. The communication system of claim 1 wherein the second interface system is configured to receive the first section overhead and the first line overhead by receiving a second SONET signal including the first section overhead and the first line overhead in a second payload.

11. A method of operating a communication system comprising:

in a first interface system, receiving a first Synchronous Optical Network (SONET) signal including first section overhead and first line overhead in a first transport overhead and including path overhead and user data in a first payload, and in response, transferring the first section overhead, the first line overhead, the path overhead, and the user data; and

in a second interface system, receiving the first section overhead, the first line overhead, the path overhead, and the user data, and in response, regenerating the first SONET signal including the first section overhead and the first line overhead in the first transport overhead and including the path overhead and the user data in the first payload, and to transferring the regenerated first SONET signal.

12. The method of claim 11 further comprising, in an optical network, receiving the first section overhead, the first line overhead, the path overhead, and the user data from the first interface system and transferring the first section overhead, the first line overhead, the path overhead, and the user data to the second interface system.

13. The method of claim 12 wherein a first communication service provider transfers the first SONET signal to the first interface system and receives the regenerated first SONET signal from the second interface system, and wherein the communication system is part of a second communication service provider.

14. The method of claim 13 wherein, in the second communication service provider, receiving the first SONET signal and transferring the regenerated first SONET signal comprises closing a SONET ring for the first communication service provider.
- 5    15. The method of claim 11 wherein, in the first interface system, transferring the path overhead and the user data comprises transferring a second SONET signal including second section overhead and second line overhead in a second transport overhead and including the path overhead and the user data in a second payload.
- 10    16. The method of claim 11 wherein, in the first interface system, transferring the first section overhead and the first line overhead comprises transferring a second SONET signal including the first section overhead and the first line overhead in a second payload.
- 15    17. The method of claim 11 wherein in the first interface system, receiving the first SONET signal and transferring the first section overhead, the first line overhead, the path overhead, and the user data comprises receiving the first SONET signal over a single optical wavelength and to transfer the first section overhead, the first line overhead, the path overhead, and the user data in parallel over multiple optical wavelengths.

18. The method of claim 17 wherein, in the second interface system, receiving the first section overhead, the first line overhead, the path overhead, and the user data and transferring the regenerated first SONET signal comprises receiving the first section overhead, the first line overhead, the path overhead, and the user data in parallel over the multiple optical wavelengths and transferring the regenerated first SONET signal over the single optical wavelength.

19. The method of claim 11 wherein, in the second interface system, receiving the path overhead and the user data comprises receiving a second SONET signal including second section overhead and second line overhead in a second transport overhead and including the path overhead and the user data in a second payload.

20. The method of claim 11 wherein, in the second interface system, receiving the first section overhead and the first line overhead comprises receiving a second SONET signal including the first section overhead and the first line overhead in a second payload.